



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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OFFICE OF
ENFORCEMENT AND
COMPLIANCE ASSURANCE

Dear Mr. Edelman:

In accordance with our responsibilities under Section 309 of the Clean Air Act and the National Environmental Policy Act, the Environmental Protection Agency (EPA) has reviewed the Department of Energy's Draft Environmental Impact Statement (EIS) for the Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste (LLRW) and GTCC-Like Waste (CEQ 20110048). Our general comments are highlighted below with detailed comments enclosed for your consideration.

GTCC LLRW is radioactive waste that is generated by the Nuclear Regulatory Commission (NRC) or Agreement States licensees containing radionuclide concentrations in excess of the limits for Class C LLRW as identified in NRC regulations 10 CFR 61.55. For the purposes of this EIS, GTCC-like waste is DOE owned or generated LLRW and non-defense-generated transuranic radioactive waste that have characteristics similar to those of GTCC LLRW and for which there may not be a path for disposal. The Low-Level Radioactive Waste Policy Act of 1985 (amending the original 1980 Act) assigned the responsibility for the disposal of GTCC LLRW to the Federal Government; the Energy Policy Act of 2005 further assigned this responsibility to the Department of Energy (DOE).

DOE is proposing to construct and operate a new facility or facilities, or use an existing facility for the disposal of GTCC LLRW and DOE GTCC-like waste. The draft EIS analyzes impacts that would be associated with the construction, operation, and long-term management of a facility for the disposal of this waste. One disposal alternative considered is a geologic repository which was evaluated at the Waste Isolation Pilot Plant (WIPP), in New Mexico. The other alternative methods evaluated include an intermediate-depth borehole, an enhanced near-surface trench, and an above-grade vault. Each of these disposal methods were evaluated at the following locations: Hanford Site, Washington; Idaho National Laboratory (INL) Site, Idaho; Nevada National Security Site (NNSS), Nevada; and the Savannah River Site, South Carolina. The conceptual designs described in the draft EIS incorporate a number of engineering enhancements beyond those typically used in designs of LLRW disposal facilities. In addition, post-closure performance calculations were performed for long time frames (10,000 years or

longer to determine peak annual doses) commensurate with the need to protect the general public for up to 10,000 years.

The draft EIS does not identify a preferred alternative. Instead, a preferred alternative will be determined after consultation with Congress, consistent with Section 631 of the Energy Policy Act of 2005 and then identified in the final EIS. The draft EIS acknowledges that once the site has been identified, a follow-on site-specific NEPA evaluation and documentation will be needed to ensure proper land use planning, assure protection of local ecological and cultural resources, and account for local variations by hydrology and geology to minimize potential waste migration.

EPA has worked closely with DOE as a cooperating agency and most of our concerns have been addressed through this process. However some clarification regarding the technical bases for the assumption of parameter values leading to faster transport of radionuclides in the subsurface and their relation to current disposal practices is recommended. For example, it may be useful to provide additional discussion of the performance history of the options so that the strengths and weaknesses and the expected degree of reliability for each alternative can be more readily assessed. Regarding the borehole disposal alternative, it may also be useful to discuss how site-specific impacts on the stability of the geologic formation from the installation of 930 boreholes to a maximum depth of 1,000 feet will be assessed. Depth and spacing of boreholes may need to be adjusted, as well as additional measures implemented to enhance stability. Flow of water through the deeper formations will also need to be evaluated.

In addition, the draft EIS has identified existing agreements (pages 1-31, 6-111, and 7-74) concerning the Hanford and INL sites. According to these agreements no, or limited amounts of, waste will be disposed of at these sites. More specifically:

- EPA has concerns with the potential selection of the Hanford site. The proposed site for the GTCC disposal facility at Hanford is close to the "200 Area." According to DOE's recent analyses in the Tank Closure and Waste Management EIS, this area has very high radionuclide and chemical contamination levels in the vadose zone, which can potentially lead to groundwater contamination well above drinking water standards. The primary contaminants of concern include Technetium-99 (Tc-99) and Iodine 129 (I-129), which are highly soluble in water. Disposal of additional waste near the 200 Area could exacerbate that contamination, especially in the event that the GTCC waste facility cover and engineered barriers fail in the longer term, allowing leaching to take place and radionuclide and chemical contamination to spread to surrounding soils and eventually to groundwater and the Columbia River. Current cleanup goals for the area include limiting additional contaminant releases to surface soils and the vadose zone and development of effective technologies to remove or immobilize the appropriate amount of existing contamination. Thus, the proposed disposal of GTCC waste does not appear to be consistent with the ongoing cleanup effort, given the amount of radionuclides already present in the area. As the draft EIS indicates, one means of mitigating that existing contamination impact would be for DOE to limit disposal of off-site waste streams to Hanford, at least waste containing Tc-99 and I-129 (p. 6-111). If this site is selected,

contamination impact would be for DOE to limit disposal of off-site waste streams to Hanford, at least waste containing Tc-99 and I-129 (p. 6-111). If this site is selected, EPA recommends that the final EIS include information addressing groundwater contamination remedial activities that would meet Washington State Model Toxics Control Act (MTCA), EPA, and tribal standards for drinking and surface water quality.

- EPA also has significant concerns with the potential selection of the INL site. At the INL site, the proposed GTCC facility would be near the existing Advanced Test Reactor Complex and the Big Lost River, and would also be located over the Snake River Plain Aquifer. This aquifer is the sole source of drinking water for nearly 200,000 people in southeast and south central Idaho (p. 7-18). Past waste disposal practices at INL have created plumes of radiochemical contamination within the aquifer. We are also concerned with the transport characteristics of this site. As presented, the assumptions of parameter values lead to a faster transport of radionuclides in the subsurface. As a result, they far exceed the values of the other alternatives. For this reason, as noted in the detailed comments attached, the technical bases that were assumed in the analysis of this site and their relation to current disposal practices should be clarified in the final EIS.

Based on the above information and issues associated with the disposal alternatives presented, we have rated the action alternatives as Environmental Concerns/Insufficient Information (EC-2), (see enclosed "Summary of EPA Rating System"). The "EC" rating is based on the potential for adverse impacts to surface water and groundwater resources. The "2" rating is based on the need to present information to fully assess the environmental impacts from the proposed action.

We appreciate the opportunity to review and comment on this document. If you have any further questions you may contact me at (202) 564-5400. You may also call my staff point of contact, Marthea Rountree. She can be reached at (202) 564-7141.

Sincerely,

A handwritten signature in dark ink, reading "Susan E. Bromm", followed by a long horizontal flourish line.

Susan E. Bromm
Director
Office of Federal Activities

Enclosures (2): Detailed Comments
Summary of EPA Rating System

**Environmental Protection Agency
Draft Environmental Impact Statement
Detailed Comments
Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste
and GTCC-Like Waste ((DOE/EIS-0375-D)**

General

Because construction of the waste disposal facility would disturb more than one acre (up to 110 acres), the project will require a National Pollutant Discharge Elimination System permit for construction activities. For this reason, DOE should consider use of Low Impact Development (LID) techniques during construction activities to reduce stormwater impacts, including contaminated runoff and sediments that would discharge to local streams.

Chapter 1 – Introduction

Waste Inventory:

In estimating the inventory of waste, the draft EIS does not appear to address the potential application of the “waste incidental to reprocessing” (WIR) process at West Valley. The WIR process allows DOE to re-consider whether waste previously considered to be high-level waste can be re-categorized as low-level waste or transuranic waste (TRU). The draft EIS takes an appropriately conservative approach by assuming that any waste exhumed from the NRC- and State-licensed Disposal Areas (NDA/SDA) at the West Valley site will be GTCC or “GTCC-like” waste. However, it should treat the potential application of the WIR process at West Valley in a manner consistent with the *Final Environmental Impact Statement for Decommissioning and/or Long-Term Stewardship at the West Valley Demonstration Project and Western New York Nuclear Service Center* (West Valley EIS, DOE/EIS-0226).

Table 3-20 of the West Valley EIS estimates that application of the WIR process could result in generation of an additional 160 cubic meters of low-level waste and 150 cubic meters of TRU waste from current site activities (not including implementation of alternatives in the EIS). Table 4-47 estimates that, if the Sitewide Removal Alternative is selected as the Phase 2 decommissioning alternative, an additional 210 cubic meters of low-level waste and 280 cubic meters of TRU waste could be generated. Thus, application of the WIR process could result in generation of an additional 370 cubic meters of low-level waste and 330 cubic meters of TRU waste. The combined volume of 700 cubic meters represents approximately 6% of the waste volume considered in the draft EIS. Volumes of high-level waste would be reduced by corresponding amounts.

The West Valley site is unusual in the sense that waste resulting from the reprocessing activities could be considered either DOE-origin or commercial-origin, and DOE-origin waste may not be attributable to defense activities. If the assumption is that any WIR

waste would be non-GTCC low-level waste or defense-origin TRU, in which case it can be accepted at the WIPP, this should be clearly stated. The final EIS should explain how the WIR process is taken into account in deriving waste estimates for the West Valley site.

Disposal Alternatives:

It may be useful to provide additional discussion of the performance history of the options so that the reader can more readily assess the strength and weakness of each option and what degree of reliability may be expected. As indicated on page 1-23, the vault design is similar to one employed at SRS. However, there is no information for the reader to judge whether it has performed as desired. How do the “enhanced” trench designs compare to those in use at other sites, and in particular to those known to have failed?

Regarding the borehole disposal alternative, it may also be useful to discuss how site-specific impacts on the stability of the geologic formation from the installation of 930 boreholes to a maximum depth of 1000 feet will be assessed. Depth and spacing of boreholes may need to be adjusted, as well as additional measures implemented to enhance stability. Flow of water through the deeper formations will also need to be evaluated.

Chapter 3 – No Action Alternative

West Valley Site:

In evaluating the No Action Alternative, the draft EIS does not appear to address the implications of GTCC and TRU waste remaining at the West Valley site as a result of selection of the Sitewide Close-in-Place Alternative for Phase 2 of site decommissioning. The West Valley EIS estimates that the Sitewide Removal Alternative will generate 4,200 cubic meters of GTCC low-level waste and 1,000 cubic meters of TRU waste (Section 2.4.1.5). However, Phase 1 of the Phased Decisionmaking Alternative is estimated to generate only 710 cubic meters of TRU waste and no GTCC waste (Section 2.4.3.6). This implies that 4,200 cubic meters of GTCC low-level waste and 290 cubic meters of TRU waste will remain at the site if the Sitewide Removal Alternative is not selected for Phase 2 (the Sitewide Close-in-Place Alternative is estimated to generate negligible volumes of GTCC and TRU waste). Further, low-level waste in excess of 1 million cubic meters will also remain on site, some of which could be DOE-origin “GTCC-like” low-level waste.

The draft EIS estimates that exhumation of the NDA and SDA at West Valley will generate 4,300 cubic meters of GTCC low-level waste and GTCC-like waste (page 1-46). This appears to account for all of the GTCC low-level waste that could remain at the site, as only 31 cubic meters is estimated to be GTCC-like waste (page 1-19). Page 1-19 further states that, of the approximately 2,200 cubic meters of GTCC-like waste originating at West Valley, about 44% is in Group 2 (yet to be generated). It appears

then that all of the GTCC-like waste from decommissioning at West Valley will be TRU waste, which will not be generated by exhumation of the NDA and SDA.

Applicable regulations for disposal of GTCC low-level and TRU waste assume a greater degree of isolation than is provided by conventional near-surface disposal facilities like the NDA and SDA (10 CFR Part 61 and 40 CFR Part 191, respectively), as have the alternatives analyzed in the draft EIS. Recognizing that the decision on final decommissioning of the NDA and SDA will not be made before the final EIS is issued, the final EIS should address the long-term implications of leaving waste on site, with reference to the West Valley EIS as appropriate. The final EIS should also identify where and in what form TRU materials would remain at the West Valley site.

Chapter 4 – WIPP

Regulatory Structure:

Section 4.7 indicates that statutory changes would be necessary to allow disposal of waste other than defense-origin TRU waste at WIPP. It also recognizes the potential involvement of both EPA and NRC as regulatory authorities for underground disposal operations. This situation is further complicated by the fact that the waste considered in the draft EIS is itself covered under multiple regulations. The discussion on page 4-11 contrasts the requirements of 10 CFR Part 61 and 40 CFR Part 191 in pointing out that magnesium oxide (MgO) is placed on defense-origin TRU waste to satisfy the assurance requirements of 40 CFR Part 191, with the implication that this would not be necessary for GTCC disposal. However, non-defense TRU would still be subject to 40 CFR Part 191 and its assurance requirements. The final EIS should discuss how DOE views this overlap in regulation and how it proposes the overlap be addressed should disposal at WIPP be the preferred alternative.

Transportation:

Transportation impacts at WIPP need to be clarified and reconciled with Table 5.3.9-3, which shows radiological impacts to the public from severe transportation accidents. Because all remote-handled (RH) waste shipped to WIPP is assumed to be packaged in shielded containers to allow disposal as contact-handled (CH) waste, and fewer shielded containers can be included in any one shipment, there are more shipments overall than assumed for the other land disposal sites. It is clear that the larger number of shipments results in a proportionately greater number of miles travelled and therefore a greater number of accidents. It is also clear that shipping RH waste in shielded containers reduces the external exposure to those living or working along the transportation route, compared to the shipments of RH waste to the other land disposal sites.

However, impacts to the public should be similar for shipments of CH waste to WIPP or the other land disposal sites. In fact, page 4-72 (addressing impacts of transportation to WIPP) refers the reader to Section 5.3.9 for “transportation impacts for CH shipments.” Page 5-85 notes that, for severe accidents, “estimated population doses and associated latent cancer fatalities (LCFs) were higher for the sealed sources and Other Waste-CH

than for the activated metals and Other Waste-RH because they had higher amounts of alpha-emitting radionuclides, which are more of an inhalation (internal) hazard.” Tables B-11 and B-12 indicate that the same number of shipments and same type of packaging are projected for the sealed source and Other Waste-CH categories, regardless of their destination. This suggests that the projected impacts of a similarly severe accident should also be comparable, if not identical.

Comparison of the “accident” column in Tables 4.3.9-1 and 4.3.9-2, which show population risks from transportation to WIPP by truck and rail, respectively, with Table 5.3.9-3 does not show consistency in either projected dose or risk for the CH waste categories. Table 5.3.9-3 shows that projected LCFs for sealed sources are generally higher than 1, with collective doses generally above 1,000 person-rem. The “accident” figures in Tables are all well below 0.1.

Several points should be clarified for the final EIS, including the meaning of the “accident” column in Tables 4.3.9-1 and 4.3.9-2 and the applicability of Table 5.3.9-3 to transportation to WIPP. Further, the statements on page 4-67 and 5-83 that “[d]ose rates for rail shipments are approximately double those for truck shipments because rail shipments are assumed to have twice the number of waste packages as corresponding truck shipments” is incorrect, particularly as it applies to shipments to WIPP. As shown in Table B-10, activated metal canisters (AMCs) and half-shielded activated metal canisters (h-SAMCs) have ratios of rail:truck of 4:1 and 3:1, respectively. These waste packages make up a significant proportion of the overall transportation. As a result, as shown in Tables B-11 and B-12, the rail:truck ratio for the other land disposal sites is about 2.5:1, while the ratio for shipments to WIPP is nearly 3:1 (because h-SAMCs are used for other types of RH waste as well as activated metals).

Waste Generation Period:

On page 4-1, line 26, it is assumed that the underground facilities will remain functional during the period projected for disposal of GTCC waste. This needs further explanation. The projected period ranges between the years 2019 and 2083 and it would be helpful to know the basis and details of the assumptions made for functionality. The properties of salt, creep rate, and the rate of deterioration should be included. It would also be helpful to mention what precautionary measures would be undertaken to maintain functionality if WIPP is selected as the site for GTCC disposal. The influence of creep closure is visible in the drift areas which have been open more than 30 years. This is a function of age of the structure and requires secondary or tertiary support to remain operational.

For completeness and better understanding of the operation procedure (which influences the EIS) the following topics should be considered in section 4.1.3.

- Mining method – the Room and Pillar type of mining method is used in WIPP underground. This has the advantage of safety and keeping the excavations open for longer period. The lower mining ratio is an important issue to consider for stability.

- Reference to the dimension of the excavations and shape of the opening should be provided. This is a factor for safety and can influence environmental and human impacts.
- In addition, a very brief mention about the nature of the support system can be added here for consideration of safety.
- The proposed changes regarding the Panels 9 and 10 need to be mentioned here and the statements on line 15-17 should be clarified.
- In the WIPP certification, MgO is the only design feature actually claimed by DOE as an engineered barrier; while the other engineered features described in lines 34-44 could potentially act as engineered barriers, they are not identified as such by DOE.
- A mention about the extent and influence of the existing fractures and clay layers in the disturbed rock zone (DRZ) would be helpful.

Geology and Soils:

In Section 4.2.2, Geology is limited to stratigraphy and physiography. A thorough investigation of geological and hydrological issues is required in selection of a potential site for disposal. Although stratigraphy is an important aspect of geology, suitability of a site primarily depends upon the lithologic characteristics, which include strength of the materials and other physical characteristics. A brief mention of these (shear strength, etc.) should be included in the final EIS.

In describing the Salado Formation on page 4-22, the final EIS should include the non-homogeneities which are important issues for waste disposal. The anhydrite layers – Master beds should be mentioned. The weak clay zones for shearing are a factor for stability.

Chapter 5 – Elements Common to Alternatives 3, 4, and 5

Page 5-29 of the draft EIS indicates that EPA's Federal Guidance Reports 11 and 12 contain dose conversion factors based on International Commission on Radiological Protection (ICRP) Publications 26 and 30. The draft EIS also states that dose conversion factors (DCFs) developed by ICRP in Publication 72 were used for the current analyses. The final EIS should highlight that EPA has included DCFs based on ICRP 72 in its CD supplement to Federal Guidance Report No. 13, *Cancer Risk Coefficients for Environmental Exposure to Radionuclides*, which can be found at <http://www.epa.gov/radiation/federal/techdocs.html>.

Chapter 7 – INL

Transport Characteristics:

Although Table E-4 indicates that the selection of distribution coefficient (K_d) values at INL was based on site-specific recommendations, some attention should be given to how this conservative assumption compares to the disposal practices at the Radioactive Waste Management Complex (RWMC). Near-surface disposal is being performed at the

RWMC. The final EIS should address the similarity of technology used at the RWMC to the borehole, trench, and vault technologies evaluated in the EIS, and should also compare the K_d assumption to the values used to authorize disposal at the RWMC. The draft EIS indicates that tritium and strontium plumes are present in the area of the reference location, but attributes these to past practices of disposal of liquids. This comparison will help the reader evaluate whether the magnitude of the projected doses are reflective of INL as a whole, or the reference location in particular.

Projected Peak Doses:

Some explanation should be provided as to why the projected doses from C-14, Tc-99, and I-129 should be significantly lower for the borehole technology as compared to the trench and vault. The draft EIS notes that these radionuclides will reach the designated receptor sooner because the disposal facility is constructed deeper, and therefore is closer to the ground water. However, this does not necessarily explain why in Figure 7.2.4-1 the peaks for the trench and vault technologies are steep and sharp, while the peak for the borehole technology is shorter and more spread over time. This pattern is also noted at other sites (e.g., Figure 8.2.4-1 for LANL). A possible explanation is that the depth and diameter of the borehole only allows a slower release of radionuclides from the upper portion of the borehole, whereas both the trench and vault are more amenable to an overall flushing of radionuclides once failure and infiltration occur. This would suggest that the borehole peak would be more spread over time, as radionuclides gradually make their way into the ground water. The final EIS should address this finding.

SUMMARY OF EPA RATING SYSTEM

Rating the Environmental Impact of the Action

- **LO (Lack of Objections)** The review has not identified any potential environmental impacts requiring substantive changes to the preferred alternative. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposed action.
- **EC (Environmental Concerns)** The review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact.
- **EO (Environmental Objections)** The review has identified significant environmental impacts that should be avoided in order to adequately protect the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). The basis for environmental objections can include situations:
 1. *Where an action might violate or be inconsistent with achievement or maintenance of a national environmental standard;*
 2. *Where the Federal agency violates its own substantive environmental requirements that relate to EPA's areas of jurisdiction or expertise;*
 3. *Where there is a violation of an EPA policy declaration;*
 4. *Where there are no applicable standards or where applicable standards will not be violated but there is potential for significant environmental degradation that could be corrected by project modification or other feasible alternatives; or*
 5. *Where proceeding with the proposed action would set a precedent for future actions that collectively could result in significant environmental impacts.*
- **EU (Environmentally Unsatisfactory)** The review has identified adverse environmental impacts that are of sufficient magnitude that EPA believes the proposed action must not proceed as proposed. The basis for an environmentally unsatisfactory determination consists of identification of environmentally objectionable impacts as defined above and one or more of the following conditions:
 1. *The potential violation of or inconsistency with a national environmental standard is substantive and/or will occur on a long-term basis;*
 2. *There are no applicable standards but the severity, duration, or geographical scope of the impacts associated with the proposed action warrant special attention; or*
 3. *The potential environmental impacts resulting from the proposed action are of national importance because of the threat to national environmental resources or to environmental policies.*

Adequacy of the Impact Statement

- **Category 1 (Adequate)** The draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.
- **Category 2 (Insufficient Information)** The draft EIS does not contain sufficient information to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the proposal. The identified additional information, data, analyses, or discussion should be included in the final EIS.
- **Category 3 (Inadequate)** The draft EIS does not adequately assess the potentially significant environmental impacts of the proposal, or the reviewer has identified new, reasonably available, alternatives, that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. The identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. This rating indicates EPA's belief that the draft EIS does not meet the purposes of NEPA and/or the Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS.